REMARKS

Reconsideration and allowance of the above-amended application are respectfully requested.

The Specification and Claim 1 have been amended. Attached is a marked-up version of the changes being made by the current amendment.

Objections to Drawings and Specification

Amendments made in the drawings and specification should overcome the objections raised in the Office Action. Upon approval by the Examiner, a set of new formal drawings will be filed.

Rejection to Claims

Claims 1, 3, 4, 11-16, 36, 38, and 39 stand rejected under 35 USC 103(a) as being obvious over Bois in view of Steele. Bois is cited to show a design for a dual-color quantum well detector based on GaAs. Steele is cited to show a bound-to-quasibound transition. The Office Action contends that the combination of Bois and Steele would show each feature in the pending claims.

Claim 1 as amended, however, recites that "said barrier layers are sufficiently thick to substantially eliminate carrier tunneling." This feature is fully supported by the original specification, e.g., page 7, line 19 to page 8, line 16; page 10, lines 15-22; page 27, lines 1-8; and page 30, line 16 to page 31, line 5. As shown by the equation on page 8, the detection efficiency is inversely proportional to the square root of the dark current. Hence, reduction of the dark current I_D caused by the tunneling effect is an important feature because a large photocurrent Ip alone is not sufficient. A combination of a low dark current I_D and a high photocurrent Ip can produce a highly efficient detector. The recited feature of the excited energy state being "substantially resonant with an energy of the well top" in Claim 1 produces a high photocurrent Ip. The recited thick barriers for substantially eliminate carrier tunneling, on the other hand, produce the desirable low dark current I_D.

Steele *fails to disclose* the latter feature. Bois is completely silent on this. Therefore, the combination of Bois and Steele fails to disclose each feature of Claim 1 as amended. Under 35 USC 103(a), Claim 1 as amended is distinctly different from, and thus is patentable over, Bois and Steele.

Other pending claims are patentable based on the above arguments as well as their own merits. For example, Claim 16 recites a 2% deviation in the energy of the excited state from the well top as being substantially resonant with the well top. Both Steele and Bois fail to disclose this specific feature.

In summary, Applicants submit that all claims be allowed. Enclosed is a $55 check for a one month extension of time. Please apply any other applicable charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

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Scott Harris
Reg. No. 32,030

BING AI
REG. NO 43,312

Fish & Richardson P.C.
PTO Customer No. 20985 * *
4350 La Jolla Village Drive, Suite 500
San Diego, California 92122
Telephone: (858) 678-5070
Facsimile: (858) 678-5099

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Version with markings to show changes made

In the specification:

Paragraph beginning at page 48, line 4 has been amended as follows:

A smooth continuum transport band is desirable in this embodiment because the two different wavelength QWIP structures are interlaced, in an alternating structure. With the LW_1 and LW_2 QWIPs next to each other, the smooth conductive band will prevent extra quantum mechanical reflections in the continuum transport band, which would otherwise occur if the transport band abruptly changed. The smooth transport band results from having a uniform barrier height between the different wavelength sensitive QWIPs in the two-color QWIP structure 1700. A uniform barrier height will generally create a smooth continuum transport band. In particular, a smooth [continum] **continuum** transport band is accomplished by using $Al_xGa_{1-x}As$ barriers for both wells and by configuring the GaAs quantum well 1704 and the $Al_yGa_{1-x}As$ quantum well 1706 to have the same barrier height. As a result, the continuum transport band 1708 is smooth across both types of quantum wells 1704, 1706.

In the claims:

Claim 1 has been amended as follows:

1. (Amended) A quantum well infrared photodetector (QWIP) comprising:

a substrate formed of a semiconductor material; and

a plurality of photodetectors disposed relative to one another to form an array on said substrate, each photodetector having first and second quantum well structures, one stacked over the other and each comprising a plurality of alternating barrier layers and well layers, each well layer of each quantum well structure coupled between two barrier layers to support an intersubband transition between a bound ground energy state and an excited energy state within a common energy band where said excited energy state is substantially resonant with an energy of the well top,

wherein materials, thicknesses and dimensions of said well layers and barrier layers are selected such that said first and said second quantum well structures effect intersubband transitions at first and second wavelengths, respectively, wherein none of said two quantum well structures is short circuited**, and wherein said barrier layers are sufficiently thick to substantially eliminate carrier tunneling**.